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Inside Story: A Guide to Indoor Air Quality - How Well Is It Working. Risk Communication Series

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The Inside Story: A Guide to Indoor Air Quality --- How Well Is It Working?

Risk Communication Series

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The U.S. EPA and the U.S. Consumer Product Safety Commission developed a booklet entitled The Inside Story: A Guide to Indoor Air Quality, designed to provide information for the general public. This report describes the small scale evaluation of the effectiveness of this booklet. This study appears to be one of the first attempts to determine how information materials requested by households actually are used by them. The evaluation examined 1) the share of requesters who read the booklet; 2) changes in their knowledge about indoor air pollution causes, and knowledge about testing and mitigation. The evaluation also asked whether respondents had tested or taken action to reduce their exposure to indoor air pollution.

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The Inside Story:

A Guide to Indoor Air Quality--

How Well Is It Working?

Donna Synstelien

U.S. Environmental Protection Agency
Washington, D.C.
January 10, 1990

The following report is an evaluation done by the Office of Policy, Planning and Evaluation for Bob Axelrad and Betsy Agle of the Office of Air and Radiation. This document was prepared with guidance and help from Ann Fisher and Reed Johnson of the Office of Policy Analysis as part of the Risk Communication Program.

The study reported in this document was conducted by the United States Environmental Protection Agency (EPA). It has been subjected to the Agency's peer and administrative review, and approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Executive Summary

Responding to the increased public interest in indoor air pollution, the U.S. EPA Office of Air and Radiation (OAR) in cooperation with the U.S. Consumer Product Safety Commission developed a booklet entitled, The Inside Story: A Guide to Indoor Air Quality. This booklet was designed to provide information on indoor air pollution to the general public. An evaluation was conducted by the Office of Policy, Planning and Evaluation (OPPE), in conjunction with OAR, to determine the effectiveness of the booklet.

The objectives of this indoor air quality information effort were to inform and raise the consciousness of the readers, and provide realistic pollution prevention solutions that readers could implement in their homes. To analyze the booklet's success in these areas OPPE conducted a survey of a representative group of those individuals who had previously requested the booklet from EPA's Public Information Center (PIC). A total of one hundred forty-four interviews were completed in July of 1989 (70.2% completion rate).

Although all respondents had taken the initiative to write or call PIC and request the booklet, only fifty-four percent of the respondents reported having read it. Little information is available to help us know whether this number is a large or small percentage of the respondents. This study appears to be one of the first attempts to determine how requested materials are used by households, and we believe further research in this area should be undertaken. However, this serves to illustrate a

problem risk communication programs encounter: not all who receive published information will actually read it.

Knowledge about indoor air pollution was measured by the respondent's agreement or disagreement with several messages contained in the booklet. Those who read the booklet were more likely to know that mitigation is not always costly. Readers tended to cite the general description of what causes indoor air pollution and the radon section as the most informative or helpful parts of the booklet.

The greatest number of mitigating actions taken against any one pollutant were those taken against environmental tobacco smoke. Over half of the households surveyed said they already had reduced, or were reducing, tobacco smoke in their homes. This may be a result of recent public opinion changes against smoking, and the increased attention given to the negative health effects of both active and passive smoking. No significant difference was found between readers and nonreaders in their mitigating efforts with respect to environmental tobacco smoke.

For the group of readers the average number of mitigating actions per household was 3.3 actions, compared to the average of 2.3 actions for nonreaders. The difference between these two averages was found to be statistically significant. Readers reported higher numbers of actions taken to reduce indoor air pollution in all ten areas of indoor air pollution recorded. The most significant differences were the increased number of mitigating activities that readers took toward radon and

formaldehyde.

Although measuring increases in knowledge is difficult, analytical testing was undertaken. However, the analysis did not yield any determinate results supporting, or rejecting, a significant relationship between the level of knowledge about indoor air pollution (as defined by the quiz score) and mitigating actions taken. Total quiz scores did not differ significantly between readers and nonreaders. Whereas analysis was unable to support The Inside Story as a strong source of information for its readers, it may reinforce perceptions, attitudes, intentions, and actions of those who already have a higher level of awareness about indoor air pollution. That may be why readers took more remediating actions than nonreaders. Cautious optimism can thus be given to the booklet as a potential source of motivation to readers to undertake specific activities. It should be noted that, in general, risk communication is very difficult.

Overall, the reaction to the booklet from its readers was very favorable. All who read the booklet felt it was written in a language they could easily understand and was well-organized. It identified sources of indoor air pollution in their homes as well as ways to reduce the pollution.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

INTRODUCTION 1

Objectives 2

Evaluation 4

EVALUATION PROCEDURE 5

Sample Selection 5

Survey Design 6

Profile of Respondents and their Households 8

RESULTS 9

Reading the Booklet 9

Judgments about Pollution 12

Learning 14

How Respondents Felt about the Booklet 17

Mitigating Actions 20

Analysis 25

CONCLUSION

APPENDIX A--Questionnaire

APPENDIX B--Profile of Respondents and their Households: General Distribution Results

INTRODUCTION

The focus on energy conservation in the past decade and a half has resulted in increasingly "tight homes," weatherized to reduce energy expenses. These efforts, however, have also served to reduce the number of air exchanges per hour between inside and outside air for those households. In addition to tighter homes, there has also been increased attention given to radon and its health effects. In 1984 a nuclear power plant worker in Boyertown, PA, set off the radiation alarm on his way to work; his home was found to contain very high levels of the naturally occurring radon gas. Since then, awareness and concern about radon and its potential dangers have been increasing. Both the weatherization efforts and the recent emphasis on radon in homes have called attention to the possibility that indoor air may contain elements hazardous to human health. This attention, along with new scientific studies on the health effects of various indoor air pollutants, has led to greater demand by the public for information on the health effects from exposure and effective mitigation procedures.

Responding to this increased interest in indoor air, the U.S. Environmental Protection Agency (EPA) Office of Air and Radiation (OAR) in cooperation with the U.S. Consumer Product Safety Commission developed a booklet, The Inside Story: A Guide to Indoor Air Quality. This booklet was designed specifically to disseminate information on indoor air pollution to the general public. In November of 1988 the Environmental Protection

Agency's Public Information Center (PIC) began distributing the booklet as it was requested[1]. Later that same month PIC began to retain all requests for information on indoor air pollution or for The Inside Story, to facilitate an evaluation of the effectiveness of the booklet. This evaluation was conducted by the Office of Policy, Planning and Evaluation (OPPE), in conjunction with OAR, and its results are reported here.

Objectives

A primary objective of any information program is to convey specific knowledge to an audience. In the communication of risk, there is a particular emphasis on conveying information about a level of risk, so that people can develop an understanding and a realistic perspective of their own risk.

Although some information programs may strive specifically to change behavior, this indoor air quality information program was not conducted to promote mitigation activities per se. Rather, its objectives were to inform, raise consciousness and provide realistic pollution prevention solutions that could be easily implemented in respondents' homes. Because the risks conveyed in the booklet are very low probability risks, a bimodal distribution of responses was likely to occur: at the low end of

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[1]This booklet also has been distributed through the Consumer Product Safety Commission, EPA's regional offices, and the Consumer Information Center in Pueblo, CO.

the bimodal response distribution there is "not enough" concern generated, while at the high end there is "overconcern" for the risk.[2]

It must be noted here that the appropriate level of concern for any pollutant, even in light of the best scientific evidence available, remains at least in part a subjective value judgement. A main objective in the communication of risk information is to enable individuals to make informed decisions about how concerned they should be. For example, even risk-averse people may have a low level of concern for a risk if they fully understand all the information about that specific risk. Whether high or low levels of concern are the result, information programs like this one endeavor to insure risk perceptions are not based on incomplete or incorrect information.

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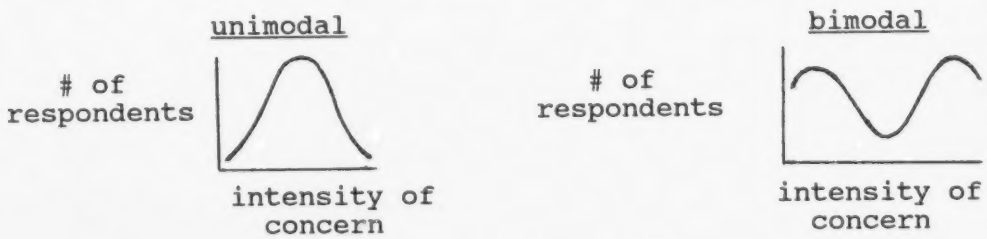
[2]A unimodal distribution is a standard distribution with one point of central tendency, while a bimodal distribution has two points. Graphically illustrated:



Economics and Psychology Policy Research for Environmental Management: An Evaluation of Strategies for Solving the Radon Problem, USEPA, May 1989, pp. 16-17.

Evaluation

Improvement of risk communication programs cannot take place without building on the evaluation of existing programs. The magnitude of the evaluation process, however, should be scaled to the overall scope of the information package being reviewed, the resources available, and the importance of the information program.

The quality of indoor air is one of the program areas under the auspices of OAR; and within the indoor air program, The Inside Story is only one of the efforts of the program. Nonetheless, this booklet is the main component of the information dissemination process, and merits evaluation to determine its reception and effectiveness. Development and distribution of the booklet itself have not been so costly and extensive as to justify an expensive, elaborate evaluation, and with these points in mind, an evaluation was designed that would provide valid and useful results without requiring an undue amount of resources. The requests for information that had come to PIC were a good starting point for evaluation and had already been collected at a minimal cost. These requests had been retained by PIC without any specific evaluation plan, and therefore were not organized in any particular way; but they could still be used to gather information from people who had requested the booklet.

EVALUATION PROCEDURE

Sample Selection

The evaluation of this booklet was conducted by surveying a representative group of individuals who requested the booklet from EPA's PIC. This group was identified from cards and letters sent to PIC, and telephone request forms completed by the PIC employees. The requests had been placed in boxes with no system of numbering or categorization. The boxes contained approximately nine thousand requests received by PIC from November of 1988 through May, 1989. Approximately 50% of the 9000 requests were ineligible for this study, because they were from businesses, not individuals.

Following consultation with OPPE's Statistical Policy Staff and considering time and resource constraints, a reasonable target sample size was determined to be 150 households. There were no phone numbers listed with the household names and addresses, so it was estimated that 50 households would not be reached due to unavailable or unpublished phone numbers. Accounting for the 50% expected to be ineligible, the households whose phone numbers could not be obtained, and an expected response rate of 70% meant that 450 names were needed--drawing a replacement sample in the original sample. Drawing a sample from the boxes of requests was cumbersome given the size and the arrangement of the requests, so the number of unusable requests was estimated and added to the number to be drawn in the first

sample. This was done to avoid having to draw a replacement sample later as households were declared unreachable. Given an estimated 9000 requests, it was concluded that every 20th request should be drawn from the boxes.

Although systematic sampling was used, this sample can be considered a simple random sample given the formation of the population from which the sample was drawn. The cards and letters were put in boxes in no particular order when they were received by PIC. In addition, they were consolidated into two very large boxes for transporting to the survey location. Given the haphazard way the requests had been treated, the sample was assumed to have the characteristics of a simple random sample for the purposes of analysis.

The interviews were conducted in July of 1989. All sample respondents had requested the booklet at least one month prior to their interview, and some of them could have received the booklet as much as eight months before the interview.

Survey Design[3]

The questionnaire was designed to be implemented over the telephone and to take no more than 10-15 minutes to complete.

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[3]This telephone survey was designed and implemented following Don Dillman's Total Design Method, as described in his book, Mail and Telephone Surveys: The Total Design Method, 1978, New York, NY, John Wiley & Sons. A copy of the questionnaire is included as Appendix A.

The interviews were conducted by one person and thus any interviewer bias will be considered consistent.

After introducing the interviewer, the purpose of the survey was explained as well as how the household was selected for the survey. Upon verifying that the booklet was received by the household, the interviewer identified the person in the household most familiar with The Inside Story: A Guide to Indoor Air Quality and proceeded with the survey, given the availability of the respondent. Households where the respondents were not available on the first contact were queried as to when the respondent would be available, and further calls were conducted only during the recommended times. Of those calls where respondents were unavailable, two-thirds were called at least five times. Those called less than five times were identified as being available only at very specific times of the week and successive efforts were not able to reach the individuals even during the prescribed times. All no-answer or answering-machine households were called a minimum of six times at different times of the day over a period of two weeks, in an attempt to find residents at home. A summary of the interview results is as follows:

Completed Interviews	144
Refusals	24
Respondent not home	18
No answer/answering machine	14
Incommunicable[4]	5
TOTAL	205
Completion Rate	70.2%

A total of one hundred forty-four interviews was completed, for a 70.2% completion rate. There were a total of sixty-nine households whose numbers were either not listed, unpublished on request, or had been disconnected. Thus, efforts were made to contact a total of 274 households, resulting in an overall completion rate of 52.6%.

The questionnaire was divided into three main sections. The first section measured the respondent's knowledge about and concern for indoor air pollution, the second attempted to determine whether any mitigating actions had been taken or were scheduled to take place, and the third requested socio-demographic information.

Profile Of Respondents And Their Households[5]

The "average" respondent was a homeowner living in a single

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[4]Several households were unable to respond to questions because respondents were very hard of hearing or otherwise impaired so that communication was not good enough for the interviewer to conduct complete interviews. Those individuals make up the "incommunicable" category.

[5]A more detailed description of socio-demographic information is included as Appendix B.

family home that had been built between 1940 and 1976. The respondent had been living in the home for 13.8 years and was not planning to move in the next year or two. The home had a basement, but it was not considered to be living space by the respondent. The mean household was a nonsmoking household, consisting of 2.7 persons, .4 under the age of 12, and .8 over the age of 60. The respondent was Caucasian with a college degree and income between $35,000 and $50,000.

The respondent had an equal chance of being male or female; and, although the respondents ranged widely in range with age, the higher age groups were more highly represented.

RESULTS

Reading The Booklet

The first question asked the respondent how long he or she spent reading the booklet, determining whether or not the booklet had been read. Fifty-four percent (53.5%) of the respondents surveyed reported having read the booklet, even though all of them had taken the initiative to write or call EPA's PIC and request it. Only part of the questionnaire was used for respondents who had not read the booklet[6].

This first result illustrates one of the problems risk communication programs encounter: not all who receive the

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[6]Those not having read the booklet were asked questions 2-4, 8-18, and 21-37.

information will actually read it. However, this is only one of the difficulties with information programs. First, an information program of this kind must get people's attention in order to make them aware that information is available. Having gotten their attention, the program must then induce people to make note of the address or phone number where the information can be obtained. Finally, it must motivate them to write or call for the information that can help them to understand the risks they face. The results of this survey indicate that, even when individuals have completed this process, there is still no guarantee that the information actually will be communicated. It seems that only the most interested individuals are likely to be motivated enough to complete the entire sequence of activities and thereby absorb the information.

A search of the literature in an attempt to compare the fifty-four percent reading rate with similar risk communication efforts revealed that relatively little is known about people's actual use of informational materials, whether they request the materials or they receive materials through general information dissemination programs. The available analyses are very sketchy and tend to be very specific. While not identical, a study by the National Center for Health Statistics (NCHS) resembles our

evaluation effort.[7] Households were interviewed regarding the use of the brochure, "Understanding AIDS," that was sent to all households in the United States by the Center for Disease Control (CDC) in June of 1988. Half of those who received the booklet actually read it; approximately the same result that was obtained in the indoor air quality booklet survey.[8] One might expect fewer people to read an unsolicited leaflet. On the other hand, at the time of the mass mailing of "Understanding AIDS," public awareness of AIDS was high, which might have cause more people to read the unsolicited leaflet. These factors make the results from the NCHS study difficult to compare with our study of The Inside Story. These studies represent early attempts to measure the use of informational materials and ensuing responses by the readers. Further research should be undertaken to increase our knowledge on whether these figures are typical.

The time allotted to actually reading the booklet varied among the group of readers, with the majority of those reading it reporting they spent less than an hour studying the booklet. About half (51%) of those who read the booklet stated they spent

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[7]National Center for Health Statistics, D.A. Dawson. AIDS Knowledge and Attitudes for July 1988, Provisional data from the National Health Interview Survey. Advance Data From Vital and Health Statistics, No. 161. DHHS Pub. No. (PHS) 89-1250. Public Health Service. Hyattsville, MD.

[8]When interviewed in July of 1988, only sixty-three percent of all responding adults recalled having received the booklet. Of those recalling they received the booklet, seventy-nine percent reported having read some or all of the brochure, and twenty percent reported they had not read any portion of the booklet. NCHS, Dawson, p.2.

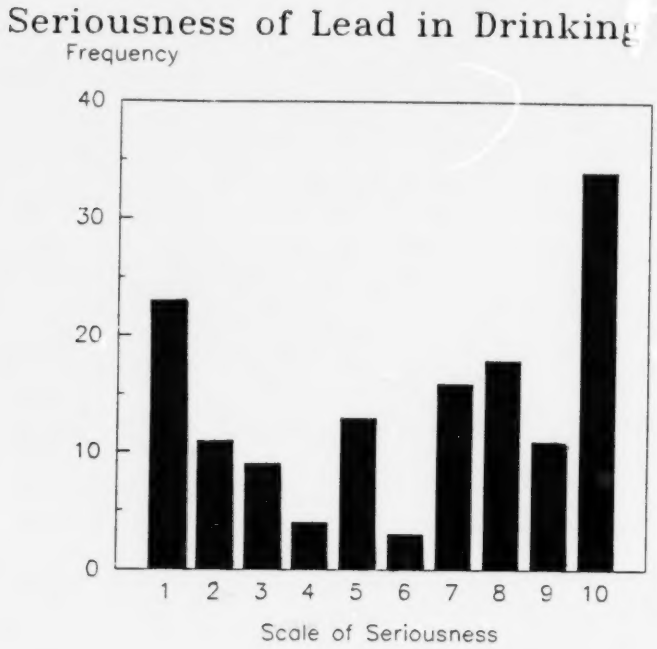
ten to thirty minutes reading it. The second largest group of readers, 21%, spent thirty to sixty minutes reading the booklet, while 13% read for less than ten minutes and 12% estimated they had read for over an hour.

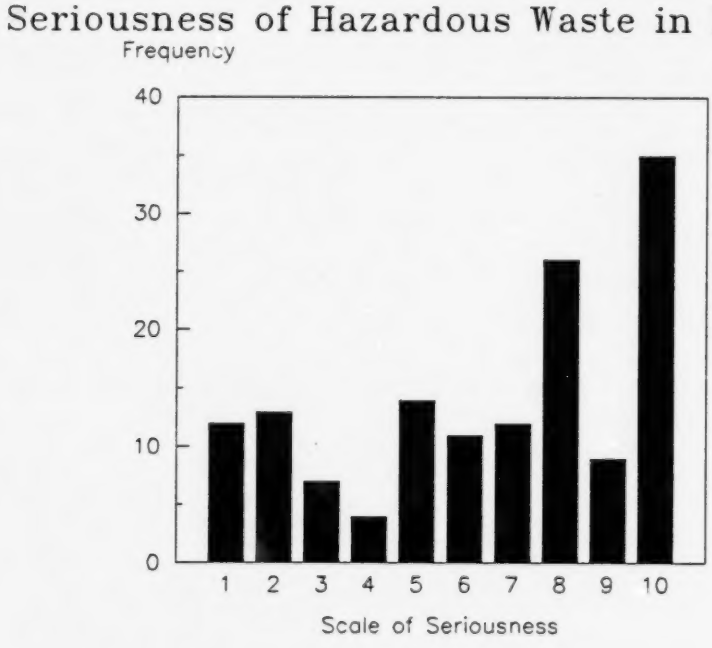
Judgements About Pollution

Questions 2 and 3 asked the respondents to give their opinion of the importance of several types of pollution, one being indoor air pollution. The third question asked the respondents to assign a value, from one (not serious) to ten (very serious), indicating how serious they thought the risks from specific types of pollution were to their households. The respondents used the same scale for the three risks listed, thus, after stating a particular level of concern for the first pollutant, lead in drinking water, the scale of seriousness became a relative one. Hazardous waste in landfills, listed second, evoked a level of concern relative to the concern the individual had reported for lead in drinking water. Indoor air pollution, listed last, was given a level of concern relative to both of the prior responses. Although indoor air pollution did cause concern among the respondents, its risks were viewed as being less serious than risks from hazardous waste in landfills.

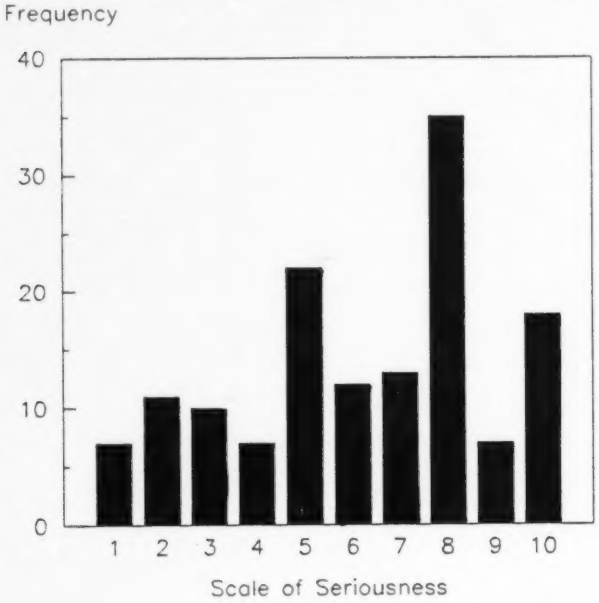
The frequency distribution for the responses on the seriousness of lead in drinking water indicates a bimodal pattern resulting from the fact that many respondents expressed strong

FIGURE 1.


Seriousness of Lead in Drinking Water
Frequency
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10
Scale of Seriousness


Seriousness of Hazardous Waste in Landfills
Frequency
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10
Scale of Seriousness

Seriousness of Indoor Air Pollution



concern for lead in drinking water and an almost equal amount displayed very little concern. Relatively few respondents showed a moderate level of concern. However, neither the seriousness of indoor air pollution nor hazardous waste responses revealed this pattern. The rating of the risks in this study may be in part attributed to the visibility given to hazardous waste sites by the media and the physical cues evident around the sites as, compared to lead in drinking water or indoor air pollution. Benign experience also could explain some of the difference in perceptions.[9] More people have had benign experiences with indoor air pollution in their homes than have experienced an unpleasant odor from a landfill or heard accounts--true or not--about a contaminated landfill or Superfund site. The pattern of concern for lead in drinking water may be because some respondents were convinced there was no lead in their drinking water, therefore, it was not a concern. On the other hand, publicity in the past few years about the adverse health effects of lead in the environment may have contributed to the high levels of concern reported among some individuals.

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[9]Fisher, Ann and Lennart Sjoberg, "Radon Risks: People's Perceptions and Reactions," Forthcoming in Environmental Radon: Occurrence, Control and Health Hazards, eds. Shyamal K. Majumdar, Robert E. Schmals, and E. Willard Miller, Pennsylvania Academy of Science.

Learning

Question 4 was designed to determine what people learned from the booklet. The seven statements read to the respondent were main messages contained in the booklet and were used to determine whether the booklet successfully communicated those points. We cannot determine from "correct" answers that the information was necessarily derived from the booklet: the respondents could have acquired that information from other sources. Unfortunately, the timing and scope of the evaluation precluded a control sample who had not had access to the booklet; thus, before-and-after answer comparisons could not be made. However, a comparison was made within the sample between those who had read the booklet and those who had not. Those who had not read the booklet can be considered a well-informed comparison group because its members had taken the initiative to order the booklet. Any difference in knowledge between this group and those who had read the booklet would be expected to understate the comparison with the general public. Incorrect answers from those who had read the booklet would appear to indicate that the booklet did not convey the desired information.

The booklet states that most indoor air pollution comes from ordinary household products, not nearby industries. It also stresses that source removal is usually the best way to reduce the pollution. Other survey answers sought were: health effects can be long term; homes do not need to be tested for a wide range

of pollutants; radon is only one of many indoor pollutants; and common everyday practices can be changed to reduce indoor air pollution without monetary expenditure.

Table I **

Question	Agree	Disagree	Don't know
Industry causes IAP	26.4%	*57.6%	16.0%
Household products cause IAP	*90.3	6.2	3.5
Source removal effectiveness	*93.7	4.2	2.1
Short-term health effects	5.6	*84.7	9.7
Should test homes	75.0	*18.7	6.2
Radon only major pollutant	4.9	*87.5	7.6
Mitigation expensive	13.9	*65.3	20.8

* Denotes correct answers as given by the booklet.
** N=144; Row sums may not equal 100% due to rounding.

Three of the results shown in Table I should be noted here. First, over a quarter of the respondents thought industry was the main cause of indoor air pollution, while another 16% were not certain. Second, almost 35% of the respondents either did not know about the levels of cost involved in mitigation activities or thought they were expensive. Finally, three-fourths of the respondents felt that homes should be tested for a wide variety of pollutants.

The responses indicating a perceived need to test for a wide range of indoor air pollutants are important, given the booklet's message and its recommendations. The booklet did not advocate extensive testing for indoor air pollutants, and specifically

recommended it only for radon. Yet, 78% of the readers and 72% of the nonreaders said households should test for a wide variety of pollutants. (This was the only statement that a higher percentage of readers than nonreaders answered incorrectly, although the difference was not statistically significant.)

Respondents may have been influenced to support testing for pollutants if they perceived testing to be the "socially acceptable" answer to the question. Moreover, respondents may have felt uncomfortable saying that testing was not needed; additional information and scientific testing may be perceived as "good" and necessary, no matter what the cost. In addition, the booklet did not recommend widespread testing, but neither did it explicitly reject it. Aside from radon, the booklet states that testing for pollutants should be undertaken "when there are either health symptoms or signs of poor air flow and specific sources or pollutants have been identified as possible causes of indoor air quality problems."[10] The booklet did not specify that testing was not necessary for any of the pollutants. Thus, the individual was left with the subjective decision to test or not.

A significant difference was found between readers and nonreaders in the statement that mitigation is always expensive (see Figure 2).[11] Fifty-eight percent of the nonreaders thought mitigation efforts could be inexpensive, while 71% of the readers

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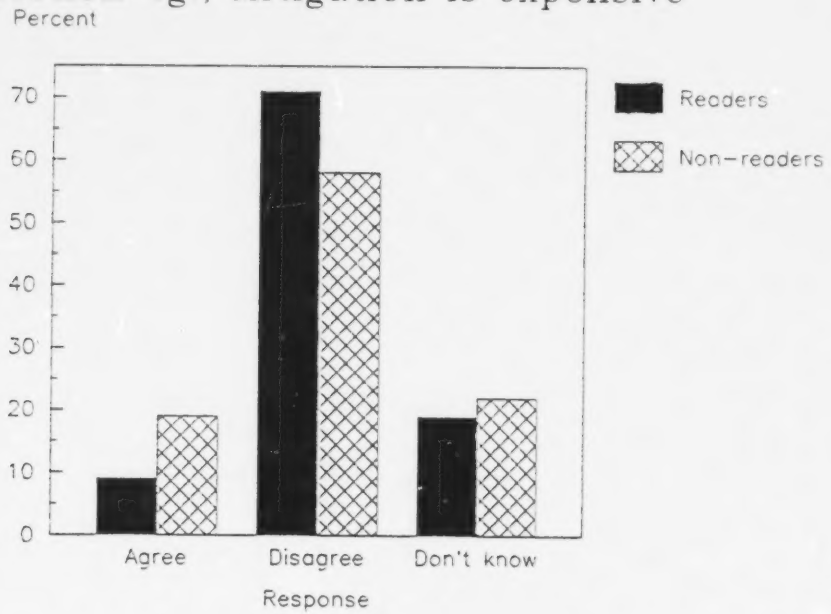
[10]The Inside Story: A Guide to Indoor Air Quality, USEPA, Sept. 1988, EPA/400/1-88/004, p. 9.

[11]At the 90% confidence level.

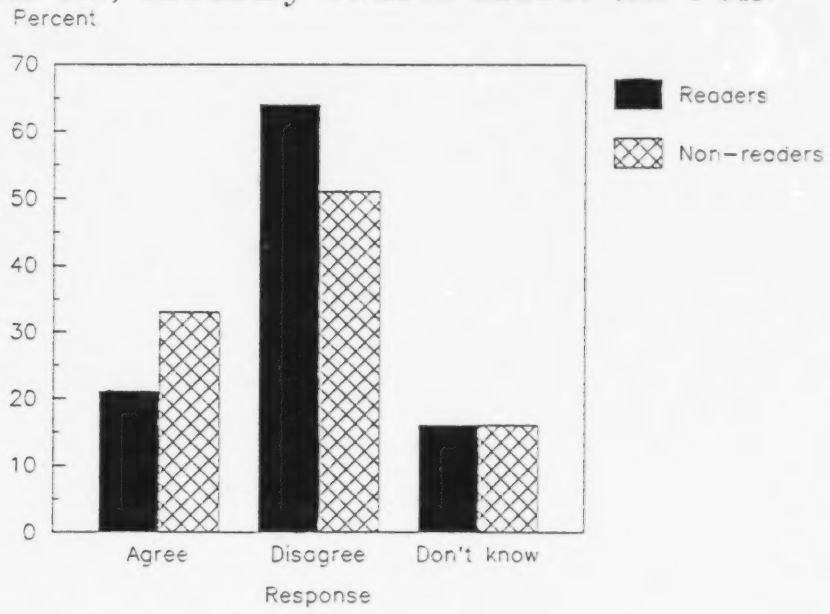
FIGURE 2.

Reader and Non-reader Comparison

Question 4g., Mitigation is expensive



Question 4a., Industry causes Indoor Air Poll.



said mitigation was not expensive. Interesting though not significant was the difference found between the readers and nonreaders on the statement that industry caused indoor air pollution. Almost two-thirds (64%) of the readers felt that industry did not cause indoor air pollution compared to a little more than half of the nonreaders who thought industry was not responsible. The remaining statements in question 4 also failed to show a significant difference between readers and nonreaders.

How Respondents Felt About The Booklet

The focus of this section of the survey then turns specifically to the booklet. Question 5 continues in the same format as question 4, asking about the layout of the booklet and how it was perceived by the respondent. Overall, the reaction to the booklet from its readers was very favorable:

Table II **

Question	Agree	Disagree	Don't know
Everyday English	100.0%	0.0%	0.0%
Difficult organization	3.9	86.8	9.2
Covered needs	82.9	7.9	9.2
Identified IAP sources	89.5	3.9	6.6
Identified ways to reduce IAP	86.8	3.9	9.2

**N=76; This question was asked only of those who reported having read the booklet. Row sums may not equal 100% due to rounding.

All who read the booklet felt it was written in a language they could easily understand.

Of the statements about the booklet, the statement that received the least amount of agreement, yet still received a favorable response from 83% of the respondents, was the statement that said the booklet covered the needs of the respondent. Several people (8% of the 77 readers) had been looking for specific pieces of information and did not find them or were well-informed prior to reading the booklet so that the booklet did not add to their knowledge as they had anticipated it would or had wanted it to.

Question 6 measured the individual's perception of the information obtained from the booklet regarding indoor air pollution. It could be argued that there was a socially acceptable answer to this question: because the respondent read the booklet he or she should have learned from the booklet. A supposedly appropriate and desired answer could exaggerate the degree of learning reported by the respondent. However, it was important to try to capture the individual's own feeling toward understanding indoor air quality and how much information he or she felt was gained from the booklet. Subjective assessments of effectiveness have been found to be poor predictors of learning; thus, whether information and understanding were actually transferred was measured by the questions on specific information and behavior.[12]

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[12]Smith, V. Kerry, William H. Desvousges, Ann Fisher, F. Reed Johnson, Communicating Radon Risk Effectively: A Mid-Course Evaluation, USEPA, July 1987, EPA/230/07/87/029, p. 6-12.

The respondents were asked to indicate on a scale from one to ten how informed they felt they were both before and after they read the booklet. It should be recognized here that each respondent attached a specific subjective value to the scale in determining where they belonged on the scale. One person's opinion of what it means to be well informed may differ strongly from another's position on the same question. Thus, the focus in these calculations was the difference between the two numbers reported by the person. This allows a relative or ordinal comparison of degrees of perceived learning instead of trying to determine an absolute or cardinal level of learning. Gains in perceived knowledge were reported in relative numbers by all respondents who had read the booklet (see Table III).

Table III

Perceived Knowledge Increase	Frequency	Percent
0 points	9	11.7%
1 "	15	19.5
2 "	19	24.7
3 "	14	18.2
4 "	10	13.0
5 "	5	6.5
6 "	1	1.3
7 "	3	3.9
8 "	1	1.3
	N=77	100.0

The greatest number of respondents (19 persons--25%) felt they had increased their knowledge by two points on the scale. (The mean level of knowledge reported before reading the booklet was 4.9 and after reading the booklet was 7.5, an average gain of

about 2 points.) This may indicate why readers took more actions. Even though they did not score better on the quiz, they believed they had learned from the booklet, and thus may have had more confidence in their ability to undertake mitigating actions.

In question 7 the respondents were asked about the specific areas of concern or of greatest interest they found in the booklet. Only 35 of the 77 readers were able to recall a section or sections of the booklet. Those who did respond cited the general description of causes of indoor air pollution and the radon section as the most informative or helpful. Fourteen of the 35 responding (40%) listed the radon section, while thirteen individuals (36%) listed the general description. It should be noted that there was some difficulty in getting responses to this question since some of the respondents had read this booklet several months earlier.

Mitigating Actions

The second section elicited information on the respondent's testing and mitigating activities. Questions 8-18 were designed to determine behavioral responses on the part of the individual and asked the respondent about his/her specific actions to reduce indoor air pollutants. Potential actions listed are those specifically recommended in the booklet, but the interviewer did not read these to the respondent. This set of questions was designed to determine whether any mitigating action was planned

for the immediate future as well as actions already taken. Only actions already taken or specific actions planned were of interest here, because vague good intentions often fail to be implemented. Only 12% of the respondents said they had taken or were planning to take no remediating actions whatsoever.

The greatest number of actions taken against any one pollutant were those taken against environmental tobacco smoke. Over half of the households surveyed said they had or were reducing smoke in their homes. This may be a result of recent public opinion changes about smoking, and increased attention given to the negative health effects of both active and passive smoking. There was no significant difference between readers and nonreaders in their mitigating efforts with respect to environmental tobacco smoke.

Far fewer households reported taking action on the other pollutants covered in the survey. Table IV shows the mitigation response rate for each pollutant.

Table IV

Pollutant	Action
Environmental tobacco smoke	55.5%
Biological contaminants	46.5
Radon	37.5
Pesticides	27.8
Respirable Particles	25.0
Organic chemicals and gases	22.2
Carbon monoxide & nit. dioxide	13.2
Lead	12.5
Formaldehyde	8.3
Asbestos	6.9

Many households reported being specifically aware of reducing

biological contaminants, such as mold and mildew, in their cleaning activities and indicated increased use of dehumidifiers in their homes. The major radon action taken was testing; many households said they either had tested or were planning to test their homes in the near future. Most who had tested did not find high levels of radon in their homes.[13] Those respondents taking action in the areas of pesticides or organic chemicals and gases described their activities as reducing storage of the substances in the house and using the products only outside or in well-ventilated areas. Removal of respirable particles from many households was accomplished by central heating and cooling systems that filtered the circulating air. Many respondents reported having their systems professionally checked on an annual or biannual basis as well as changing the filters regularly.

The average number of actions taken per household for the entire sample was 2.8 actions. For the group of readers the average number of actions per household was slightly higher at 3.3 actions per household, while the nonreader subset was slightly lower at 2.3 actions. A t-test between the readers and the nonreaders reveals that these differences are significant at the 99% confidence level.

There were consistent differences in mitigating actions between those who had read and those who had not read the booklet. Readers reported higher numbers of actions taken to

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[13]High levels are defined here as greater than the EPA guideline action level of 4 pCi/l.

reduce indoor air pollution in all areas of indoor air pollution recorded. Although the difference between the means of the two groups was significant for the sum of all the mitigating actions taken, not all of the differences in means for individual actions were significant, as shown in Table V.

Table V

Pollutant	Percent Taking Action: Readers	Nonreaders	
Environmental tobacco smoke	57.1%	53.7%	
Biological contaminants	51.9	40.3	*
Radon	48.0	25.4	***
Pesticides	31.2	23.9	
Respirable Particles	28.6	20.9	
Organic chemicals and gases	24.7	19.4	
Carbon monoxide & nit. dioxide	15.6	10.4	
Lead	16.9	7.5	**
Formaldehyde	13.0	3.0	***
Asbestos	7.8	6.0	

Individual means tests results:
*** 95% confidence level
** 90% confidence level
* 80% confidence level

The greatest significance in the differences between the readers and the nonreaders was found in the mitigating activities for radon and formaldehyde. No significant difference was found for tobacco smoke, carbon monoxide and nitrogen dioxide, organic chemicals and gases, asbestos, respirable particles and pesticides. As previously suggested, the lack of difference between readers and nonreaders for environmental tobacco smoke may reflect current general attitudes about smoking.

Question 18 inquired how much money had been invested in reducing indoor air pollution in the last year. This question

cannot be interpreted as determining what, if any, degree of action was taken. Many actions taken by households do not require a purchase but rather necessitate a change in habits or lifestyle. Over fifty percent of the respondents (56%) had not spent any money on mitigating efforts. The largest group of respondents who had spent money on efforts to reduce indoor air pollution (28%) spent less than one hundred dollars on their purchases. These reported expenditures do, however, represent only a possible lower bound on welfare costs of reductions in indoor air pollution. Subjective costs associated with a change in habit or lifestyle can be an additional source of welfare costs, thereby increasing total welfare costs of reducing indoor air pollution to the individual.

Questions 19 and 20 determined whether the booklet had been used as a source for further information. Eight percent of those who read the booklet contacted sources listed in the booklet. This suggests that the booklet met the perceived needs of the remaining readers, as well as helping the eight percent get the additional information they wanted. Thirty-eight percent of the respondents reported having shared the booklet with someone outside their household, particularly family and associates.

The final section was made up of fifteen basic socio-demographic information questions. This information was used to construct the profile of households previously discussed.

Analysis

Multiple influences affecting the data prompted the use of regression analysis: a set of statistical techniques used to estimate the importance of the influence of individual factors on data collected. Regression analysis was used to attempt to predict the mitigating action levels of the respondents (DUMACT), the scores of the respondents on the questions regarding facts about indoor air pollution (QSCORE), and the scores of the readers in their evaluation of the booklet (BKSCORE).

The logit method was used to predict the mitigating action levels of the respondents.[14] Respondents taking action were divided into two categories: those completing one to three actions and those performing four or more activities. This division reflected the pattern of responses observed in the data and recognizes differences in the level of difficulty, involvement, and cost of remediating activities. For example, mitigating activities for some respondents consisted of discouraging smoking inside their house and using a disinfectant in their regular household cleaning activities. These activities are much less costly and difficult than installing an exhaust fan in a kitchen or bathroom. Because respondents who engaged in higher motivation activities had generally completed low motivation actions as well, the average of three actions was used

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[14]This particular regression technique is well suited to the qualitative data obtained from this survey.

as the action level separating the lower from higher action level respondents. Table VI indicates for those who undertook one to three actions, only the presence of at least one smoker in the household was significant, having a negative effect on the level of actions undertaken.

More variables were significant for those who undertook four or more actions. Asymptotic t-test scores for readers and the seriousness scale assigned to indoor air pollution by the respondent were positive and significant. The smoker variable was again negative and significant for this group.

The quiz score proxy for knowledge was positive but insignificant, indicating that more knowledge did not necessarily mean more mitigating activity. It should also be noted that education, age, income, and presence of children failed to enter significantly in earlier computer runs, so were dropped for this analysis.

The scores from each part of question 4 (the quiz question) were consolidated to construct a total quiz score.[15] Table VII shows, as would be expected, those respondents who were better educated scored significantly higher on the test. However, the fact that a respondent was a reader had no significant impact on the total quiz score. Age and sex influences were also controlled for.

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[15]Parts (b) and (c) were recoded with "strongly agree" receiving a value of four points. This allowed all correct answers to have a maximum value of four points, thus, the total number of points possible on the information quiz was 28.

Table VI

Maximum Likelihood Estimates of Levels of Mitigating Actions Taken

Explanatory Variables	Dependent Variables	
	1-3 Actions	>3 Actions
READER	0.454	1.404
	(0.746)	(2.085) **
SERIOUSNESS SCALE	0.076	0.288
	(0.684)	(2.243) **
SMOKER	-1.688	-1.210
	(-2.750) ***	(-1.716) *
QUIZ SCORE	0.001	0.092
	(0.013)	(0.847)

Log-likelihood=-114.38

Two-tailed tests; N=140

Results listed: Coefficient
(T-ratio)

*** 99% significance
** 95% significance
* 90% significance

Table VII
Ordinary Least Squares Estimates
of Quiz Scores

Explanatory Variables:

READER	-2.542
	(-1.441)
SMOKER	-0.960
	(-1.470)
EDUCATION	0.577
	(2.453) **

Two-tailed tests; N=140; adj r-square 0.119

Table VIII
Ordinary Least Squares Estimates
of Booklet Rating

Note: The **lower** the booklet rating, the more **highly** the booklet was evaluated.

Explanatory Variables:

QUIZ SCORE	-0.056
	(-1.182)
PERCEIVED KNOWLEDGE LEVEL AFTER READING BOOKLET	-0.190
	(-2.090) **
PERCEIVED KNOWLEDGE INCREASE	-0.176
	(-2.305) **
EDUCATION	0.091
	(0.772)

Two-tailed tests; N=56; adj r-square 0.204

Note: *** 99% significance
** 95% significance
* 90% significance

Results listed: Coefficient
(T-ratio)

Age and sex were controlled for.

Estimation of the readers' evaluation of the booklet was done using ordinary least squares, a standard regression analysis technique. The scores from question 5 were consolidated using a method similar to that used for the quiz score. (Given the coding method, the lower the sum of the values, the higher the booklet was evaluated or "graded.") The respondents who felt they had learned more from the booklet gave it a more positive evaluation, as did those who gave themselves a high value for how well they felt they were informed after they read the booklet.[16] What again was noticeably absent from the significant variables in the estimated equation was the quiz score. Those whose quiz scores showed higher levels of knowledge about indoor air pollution did not necessarily rate the booklet more favorably. Education also failed to enter the equation significantly. (see Table VIII) Age and sex were controlled for in this estimation.

CONCLUSION

The reception of The Inside Story was positive and, in general, the booklet was very favorably evaluated by its readers. The readers felt the booklet was well-organized, and conveyed both the sources of indoor air pollution in their homes and

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[16]There is a positive correlation between these two variables implying the presence of multicollinearity in the estimation equation. This statistical problem should be noted, but given the constraints of this evaluation, no attempt was made to correct for this in the data set.

effective ways to reduce this pollution. Thus, the booklet did meet its goal of being a readable and informative resource document.

The booklet also appears to have been successful in increasing mitigating activities. Comparing the actions of those who read the booklet and those who did not read the booklet reveals that readers took more remediating actions than nonreaders. However, careful consideration should be given to the statements that can be made about this relationship. It may be that those who read the booklet had a greater initial concern about indoor air pollution and therefore a greater likelihood of taking action. They may already have been well-informed and taking measures to reduce indoor air pollution before receiving the booklet, or they might have taken some of the measures even if they had not read the booklet. Even with these caveats, it appears that cautious optimism can be given to the booklet as a potential source of motivation to readers to undertake specific mitigating activities.

The purpose of The Inside Story was to disseminate knowledge and raise awareness, and provide information about pollution prevention that could be implemented in people's homes, but not necessarily to motivate people to undertake mitigating activities. Evaluating this goal, however, is not an easy task. First, no control group or baseline measure existed to help determine by how much the target group's knowledge and awareness increased. No data collection was done prior to release of the

booklet against which a later level of knowledge could be measured. Second, and more importantly, establishing the direction of causality in any analysis of the acquisition of knowledge in an uncontrolled environment is problematic: knowledge cannot easily be attributed to one particular source, given our inability to control all other sources of information influencing the individual. Specifically, we are unable to establish that this booklet served as the source of the knowledge held by the respondents of the survey.

Despite these and other difficulties inherent in measuring increased knowledge, this study did attempt to evaluate the ability of this booklet to inform its readers. The analytical results provide no evidence that The Inside Story actually improved knowledge and raised awareness of its readers. Unfortunately, these regression results also do not yield any strong recommendations about how to improve quiz scores or mitigating behavior. Even so, the readers felt their knowledge had been increased by reading the booklet and they did take significantly more mitigating actions. This in itself justifies the effort and resources used for The Inside Story. It is also conceivable that this group actually was less well-informed than non-readers before reading the booklet.

In conclusion, the little evidence there is available

indicates that effective risk communication is very difficult.[17] In light of such studies the results of this survey should not be viewed as overly negative. Given the difficulty of effective risk communication and the even greater task of evaluating the effectiveness, the program office should be commended for allowing this evaluation of their efforts. The evaluation cannot demonstrate an increase in knowledge and awareness, which was the primary objective of the booklet. However, the booklet apparently did lead to significantly more protective behavior. For such a small scale risk communication effort, that outcome can be considered successful. This evaluation may not have produced highly significant results; however, it suggests that we know relatively little about the relationship between awareness, knowledge and mitigating behavior. Only by such efforts--both in risk communication and evaluation of these programs--will more be learned about the risk communication process and the success of these programs.

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[17]See Covello, V.T., D. von Winterfeldt, and P. Slovic, "Risk Communication: A Review of the Literature," 1987, Risk Abstracts, 4, pp. 171-182.

Appendix A OBS # _____

Name_____

Address_____

_____

Phone_____ REGION_____

Date Time Result Recall Code

Abbreviations:

NA = no answer	WN = wrong number
NH = respondent not home	IC = interview completed
WR = will return	PIC = partially completed
DISC = disconnect	RC = return call
AM = answering machine	ET = eastern time

I = IDENTICAL TO A PRIOR QUESTION
VS = VERY SIMILAR TO A PRIOR QUESTION
S = SIMILAR OR BASED ON A PRIOR QUESTION

********** ALL CAPS ARE NOT READ **********

Hello. Is this the _____ residence?
(last name)

(IF NO, The number I was calling is _____ and it was for _____ residence.)
(full name)

(IF WRONG NUMBER, I am sorry to have bothered you.)

My name is _____ and I'm conducting a study to determine the effectiveness of the recent publication, The Inside Story: A Guide to Indoor Air Quality. This is not a sales call.

Your household was chosen randomly from the group of people who requested this publication from the Environmental Protection Agency.

I'd like to ask you some questions about the booklet. It's very important to us to know what you think, so we can tell whether our efforts to inform you are working. All answers you give will be kept strictly confidential. This will only take a few minutes.

USE IF RELUCTANT: Again, this is not a sales call. It is a study sponsored by the Environmental Protection Agency.

1. First of all, did your household receive the Guide to Indoor Air Quality from EPA? (It has a blue and grey cover.)

A. NO.....01
---I'm sorry. One was sent to your household but apparently failed to reach you. Would you like me to arrange for another copy to be sent to you? (REAFFIRM ADDRESS) May I ask you a few general questions about the environment? CONTINUE WITH QUESTIONS 2-4 AND 8-37, SKIPPING QUESTIONS 19 AND 20.

B. YES.....02

** Are you the person in your household most familiar with the booklet?

i) NO--May I speak with him/her?
--Is there a convenient time when he/she will be available to talk with me? SCHEDULE CALLBACK
ii) YES

** About how much time did you spend reading this booklet?

a. LESS THAN 10 MINUTES.....01
b. 10 TO 30 MINUTES.....02
c. 30 TO 60 MINUTES.....03
d. OVER AN HOUR.....04

e. DID NOT READ.....00
* IF 0 MINUTES, CONTINUE WITH QUESTIONS 2-4 AND 8-37, SKIPPING QUESTIONS 19 AND 20

2. Compared to other environmental issues that might affect your health, do you think indoor air pollution is:

a. more important.....01
b. just as important.....02
c. or less important.....03
d. DON'T KNOW.....04

3. On a scale from 1 to 10, with one meaning **not at all serious**, and 10 meaning, **very serious**, tell me how serious you think the risks from each of the following types of pollution are to your household.

a. first, lead in drinking water _____
b. hazardous wastes in landfills _____
c. indoor air pollution _____

4. I'm going to read several statements. Please tell me whether you strongly agree, agree, disagree or strongly disagree with each statement. If you don't know, just say "don't know."

1 2 3 4 99

a. Most indoor air pollution comes from nearby industries.....SA A D SD DK
b. Ordinary household products can cause indoor air pollution.....SA A D SD DK
c. The best way to reduce indoor air pollution usually is to remove the source of the pollution.....SA A D SD DK
d. The only health effects coming from indoor air pollution are short-term.....SA A D SD DK
e. Most people need to test their homes for a wide variety of indoor air pollutants.....SA A D SD DK
f. Radon is the only major indoor air pollutant..SA A D SD DK
g. Reducing indoor air pollution is always very expensive.....SA A D SD DK

Now some statements about the booklet; again, strongly agree, agree, disagree, strongly disagree.

1 2 3 4 99

5. a. The booklet was written in everyday English...SA A D SD DK
b. The organization of the booklet was hard to follow.....SA A D SD DK
c. The booklet covered what you needed to know...SA A D SD DK
d. The booklet helped you identify possible sources of indoor air pollution in your home..SA A D SD DK
e. The booklet described practical ways to reduce indoor air pollution in your home.....SA A D SD DK

6. On a scale of 1 to 10, with 1 meaning **not informed** and 10 meaning **very informed**, how informed did you feel you were about indoor air pollution:

a. before you received the Guide to Indoor Air Quality? _____
b. after you received the booklet? _____

7. Can you think of any particular information in the booklet that you found most informative or helpful?

CIRCLE ALL THOSE ANSWERS WHICH APPLY. **ANSWERS ARE NOT READ**
a. GENERAL DESCRIPTION OF CAUSES OF INDOOR AIR POLLUTION..01

b. HOW INDOOR AIR POLLUTION AFFECTS YOUR HEALTH.....02
c. DESCRIPTION OF STEPS TO REDUCE INDOOR AIR POLLUTANTS...03
d. REFERENCE GUIDE (MIDDLE OF BOOKLET).....04
e. MEASURING POLLUTANTS IN THE HOME.....05
f. ADDITIONAL SOURCES OF INFORMATION.....06
g. BUILDING A NEW HOME.....07
h. INFORMATION ON WEATHERIZING HOMES.....08
i. SICK BUILDING SYNDROME.....09
j. APARTMENT LIVING.....10
k. RADON.....11
l. ENVIRONMENTAL TOBACCO SMOKE.....12
m. BIOLOGICAL CONTAMINANTS, SUCH AS BACTERIA AND MOLD.....13
n. CARBON MONOXIDE.....14
o. NITROGEN DIOXIDE.....15
p. RESPIRABLE PARTICLES THAT ARE RELEASED WHEN FUELS ARE INCOMPLETELY BURNED.....16
q. ORGANIC CHEMICALS AND GASES, SUCH AS PAINTS,VARNISHES AND FUELS.....17
r. FORMALDEHYDE.....18
s. PESTICIDES.....19
t. ASBESTOS.....20
u. LEAD.....21
v. OTHER (SPECIFY) _____ ...22
w. DON'T KNOW/NO OPINION.....99

INDICATE ALL THAT APPLY. **ANSWERS ARE NOT READ**.

** Within the last year, have you taken, or do you have plans to take, any measures to reduce _____ in your home?

8. **Radon**

NO.....01
YES.....02

What have you done or are you doing?
a. TEST HOME RADON LEVELS _____ PCI/L
b. MORE INFORMATION OR PROFESSIONAL ADVICE (E.G. EPA GUIDELINES)
c. SEAL CRACKS AND OTHER OPENINGS IN BASEMENT FLOOR
d. INCREASE VENTILATION
e. TREAT RADON CONTAMINATED WELL WATER
f. DECREASE SMOKING IN HOME
g. PLANS TO _____
h. OTHER (SPECIFY) _____

9. **Environmental tobacco smoke**

NO.....01
YES.....02

What have you done or are you doing?
a. STOP SMOKING

b. DISCOURAGE OTHERS FROM SMOKING
c. ASK SMOKERS TO SMOKE OUTSIDE
d. PLANS TO _____
e. OTHER (SPECIFY) _____

10. **Biological contaminants**, such as bacteria or mold

NO.....01
YES.....02

What have you done or are you doing?
a. INSTALL FANS VENTED TO THE OUTDOORS IN THE KITCHEN AND/OR BATHROOM(S)
b. INCREASE USE OF THE FANS VENTED TO THE OUTDOORS IN THE KITCHEN AND/OR BATHROOM(S)
c. VENT CLOTHES DRYER OUTSIDE
d. CLEAN HUMIDIFIER MORE FREQUENTLY
e. USE ONLY DISTILLED WATER IN THE HUMIDIFIER
f. EMPTY WATER TRAYS IN APPLIANCES MORE FREQUENTLY
g. CLEAN AND DRY, OR REMOVE, WATER-DAMAGED CARPET(S)
h. DECREASE USE OF BASEMENT AS A LIVING AREA
i. CONSCIOUSLY ATTEMPT TO MAINTAIN HUMIDITY AT 30-50%.
j. VENTILATE THE ATTIC AND CRAWL SPACE TO PREVENT MOISTURE BUILD-UP
k. PLANS TO _____
l. OTHER (SPECIFY) _____

11. **Carbon monoxide and nitrogen dioxide**

NO.....01
YES.....02

What have you done or are you doing?
a. PROPERLY ADJUST GAS APPLIANCES
b. VENT GAS SPACE HEATERS AND FURNACES
c. PROPER FUEL IN KEROSENE SPACE HEATERS
d. INSTALL EXHAUST FAN, VENTED TO THE OUTDOORS, OVER GAS STOVE
e. INCREASE USAGE OF EXHAUST FANS, VENTED TO THE OUTDOORS, OVER GAS STOVE
f. CHOOSE PROPERLY SIZED WOOD STOVES CERTIFIED TO MEET EPA EMISSIONS STANDARDS
g. CHECK SEAL ON WOOD STOVE DOOR
h. TRAINED PROFESSIONAL VISIT--INSPECT, CLEAN AND TUNE-UP CENTRAL HEATING SYSTEM
i. DECREASE IDLING OF CAR IN GARAGE
j. PLANS TO _____
k. OTHER (SPECIFY) _____

12. **Respirable particles**, which are released when fuels are not completely burned,

NO.....01
YES.....02

What have you done or are you doing?
a. VENT FURNACES TO THE OUTDOORS
b. CHOOSE PROPERLY SIZED WOOD STOVES CERTIFIED TO MEET EPA EMISSIONS STANDARDS
c. CHECK SEAL ON DOOR OF WOOD STOVE
d. CHANGE FILTERS ON CENTRAL HEATING AND COOLING SYSTEMS AND AIR CLEANERS
e. TRAINED PROFESSIONAL VISIT--INSPECT, CLEAN AND TUNE-UP CENTRAL HEATING SYSTEM
f. PLANS TO _____
g. OTHER (SPECIFY)_____

13. **Organic chemicals and gases**, such as from paints and fuels?

NO.....01
YES.....02

What have you done or are you doing?
a. MORE AWARE OF MANUFACTURER'S DIRECTIONS
b. USE PRODUCTS OUTDOORS OR IN WELL-VENTILATED AREAS
c. DISCARD UNUSED OR LITTLE-USED CONTAINERS SAFELY
d. BUY QUANTITIES TO BE USED SOON
e. PLANS TO _____
f. OTHER (SPECIFY)_____

14. **Formaldehyde**

NO.....01
YES.....02

What have you done or are you doing?
a. USE EXTERIOR GRADE, LOWER EMITTING, PRESSED WOOD PRODUCTS
b. MAINTAIN MODERATE TEMPERATURES AND REDUCE HUMIDITY LEVELS TO 30-50%
c. INCREASE VENTILATION, PARTICULARLY AFTER NEW SOURCES OF EMISSION HAVE BEEN INTRODUCED.
d. PLANS TO _____
e. OTHER (SPECIFY) _____

15. **Exposure to pesticides**

NO.....01
YES.....02

What have you done or are you doing?
a. MORE AWARE OF MANUFACTURER'S DIRECTIONS
b. MIX OR DILUTE OUTDOORS
c. APPLY ONLY IN RECOMMENDED QUANTITIES
d. TAKE PETS OR PLANTS OUTDOORS TO APPLY
e. GREATER USE OF NON-CHEMICAL METHODS OF PEST CONTROL

f. SELECT PEST CONTROL COMPANY CAREFULLY
g. DECREASE STORAGE OF UNNEEDED PESTICIDES INSIDE THE HOME
h. DISPOSAL OF UNWANTED CONTAINERS MORE SAFELY
i. STORAGE OF CLOTHES WITH MOTH REPELLENTS IN SEPARATELY VENTILATED AREAS
j. INDOOR SPACES CLEAN AND WELL-VENTILATED IN ORDER TO ELIMINATE OR MINIMIZE USE OF AIR FRESHENERS
k. PLANS TO _____
l. OTHER (SPECIFY) _____

16. **Asbestos**

NO.....01
YES.....02

What have you done or are you doing?
a. PROFESSIONAL ADVICE TO IDENTIFY POTENTIAL ASBESTOS PROBLEMS
b. TRAINED AND QUALIFIED CONTRACTORS
c. REPLACE WOODSTOVE DOOR GASKETS WHICH MAY CONTAIN ASBESTOS, FOLLOWING PROPER PROCEDURE
d. PLANS TO _____
e. OTHER (SPECIFY) _____

17. **Lead**

NO.....01
YES.....02

What have you done or are you doing?
a. PAINT TESTED FOR LEAD
b. MORE CARE IN NOT DISTURBING LEAD-BASED PAINT
c. COVER LEAD-BASED PAINT WITH WALLPAPER OR OTHER BUILDING MATERIAL
d. USE WELL VENTILATED AREAS FOR HOBBIES AND HOUSEHOLD MAINTENANCE ACTIVITIES INVOLVING LEAD
e. CONSULT HEALTH DEPARTMENT ABOUT REMOVAL AND CLEANUP IF LEAD EXPOSURE IS SUSPECTED
f. TEST BLOOD LEVELS
g. TEST DRINKING WATER FOR LEAD
h. PLANS TO _____
i. OTHER (SPECIFY) _____

(VS)
18. In the past year, about how much money have you spent on testing for or reducing indoor air pollution in your home?

a. NONE.....01
b. < $100.....02
c. $100 - 199.....03
d. $200 - 499.....04
e. $500 - 999.....05
f. $1000 OR OVER.....06

19. Have you contacted any of the sources listed in the booklet?

a. NO.....01
b. YES.....02

Which one(s)? _____

_____

20. Have you shared the booklet or recommended the booklet to others not in your household?

a. NO.....01
b. YES
Who would that be?
FAMILY/RELATIVES--NOT LIVING WITH THEM.....02
FRIENDS/NEIGHBORS.....03
OTHER (SPECIFY)..____..04

****

Now just a few general background questions and we'll be finished.

(I)
21. About how many years have you lived at this address? _____

(I)
22. Do you own your own home?

a. NO.....01
b. YES.....02
c. DON'T KNOW.....99

(VS)
23. What type of home is it?

a. SINGLE-FAMILY HOME.....01
b. MOBILE HOME.....02
c. DUPLEX.....03
d. TOWN-HOUSE.....04
e. CONDOMINIUM.....05
f. APARTMENT.....06
g. OTHER (SPECIFY) _____.....07
h. DON'T KNOW.....99

(I)
24. To the best of your knowledge was your home built:

a. before 1940.....01
b. between 1940 and 1976.....02
c. or after 1976.....03
d. DON'T KNOW.....99

(VS)
25. Are you planning to move during the next year or two?

a. NO.....01
b. YES.....02
c. MAYBE.....03

(I)
26. Does your home have a basement?

a. NO (GO TO 28).....01
b. YES.....02

(I)
27. Is any part of your basement used as living space by you or your family?
a. NO.....01
b. YES.....02

(I)
28. How many people are in your household? _____

(I)
29. How many under the age of 12? _____

30. How many over the age of 60? _____

(VS)
31. Does anyone in your household smoke cigarettes or other tobacco products?

a. NO.....01
b. YES.....02

(I)
32. What was the highest grade of school that you completed?

a. NO SCHOOL.....01
b. GRADE SCHOOL (1-8).....02
c. SOME HIGH SCHOOL (9-11).....03
d. HIGH SCHOOL GRADUATE (12).....04
e. SOME COLLEGE (13-15).....05
f. COLLEGE GRADUATE (16).....06
g. POSTGRADUATE (17+).....07

(VS)
33. Please tell me which age category you are in.

a. 18 - 24.....01
b. 25 - 34.....02
c. 35 - 44.....03
d. 45 - 54.....04
e. 55 - 64.....05
f. 65 and over.....06

(VS)
34. What is your racial or ethnic background?

a. WHITE OR CAUCASIAN.....01
b. BLACK OR NEGRO.....02
c. HISPANIC.....03
d. ASIAN OR PACIFIC ISLANDER.....04
e. NATIVE AMERICAN INDIAN 05
f. REFUSAL.....99

(I)
35. What is your sex? (**ASK ONLY IF UNCLEAR**)
a. MALE.....01
b. FEMALE.....02

(VS)
36. I'm going to read a list of broad income categories for **family** income from all sources **before** taxes during 1988. (1986 USED IN MD STUDY) Please tell me to stop when I get to yours.

a. $5,000 or under.....01
b. $5,001 - 15,000.....02
c. $15,001 - 25,000.....03
d. $25,001 - 35,000.....04
e. $35,001 - 50,000.....05
f. $50,001 - 65,000.....06
g. $65,001 - 80,000.....07
h. $80,001 and over.....08
i. REFUSAL.....99

Thank you very much for your cooperation.

37. Is there anything you could suggest to improve this booklet or future information on indoor air quality? (FOR THOSE WHO HAVE NOT READ THE BOOKLET: Is there any specific information about indoor air quality you would find useful?)

Again, thank you. Your responses will be combined with others and analyzed to help us improve our communications about indoor air quality.

APPENDIX B

Profile of Respondents and Their Households:

General Distribution Results

The majority of the respondents (89%) in the survey were homeowners, and most lived in detached, single-family dwellings (82% of the total respondents). For the remainder of the respondents, 6% each lived in townhouses and apartments, 4% lived in condominiums, 2% were in duplexes. Only one household (.7%) lived in a mobile home.

Fifty-eight percent of the respondents lived in homes built between 1940 and 1976; 25% were in homes built since 1976, and 17% resided in homes built before 1940. Most (80%) were not planning to move in the next year or two, 10% were planning to move, and an additional 10% thought they may be moving.

Two-thirds of the respondents had basements in their homes. Of those, only 20% said their basement was used as living space by their household.

Although the mean number of occupants in the household was 2.7, the largest percentage of households, 51%, consisted of two persons. Those with three in the household made up 17% of the sample; four persons, 16%; and those with 1 or 5 persons each had 8% of the respondents. One household (.7%) reported having 6 persons in it.

The distribution of specific age groups in the reporting households revealed 77% of the households had no members under

the age of 12. About twelve percent reported having one member of the household in that age group, 9% had two persons, and 2% had three under age 12. In the "over 60" category, 56% of the respondents reported no one in the household in that group. There were 14% with one person in that classification, 28% with 2, and 3% with 3 members over age 60.

The respondents themselves ranged widely in age, with more representation of the higher age groups. The age group 65 years old and over had the largest representation making up 28% of the respondents. Thereafter, representation in the survey decreased with age: ages 55 to 64, 23%; ages 45 to 54, 17%; ages 35 to 44, 16%; ages 25 to 34, 15%; and for the age group 18 to 24, there was only one representative (.7%).

The respondents of this survey were for the most part well educated; almost eighty percent of those interviewed had at least some college experience. Over thirty percent (32%) of the respondents had four year college degrees, an additional 24% had some college background, and 22% had post graduate education.

The majority of the respondents were caucasian in their racial background (98%, N=143). The two sexes were evenly represented in the survey: male, 51%, female 49%.

Of those who did report their income (N=123), the category most highly represented was the $35-50K range with 22% of the respondents. Three categories were equally represented, each with 15% of those responding: $25-35K, $50-65K, and $80K and over. Thirteen percent were in the $15-25K range, while 12% were in the $65-80K range. Only about seven percent of participating

respondents reported incomes of less than fifteen thousand dollars.